WHAT IS CLAIMED IS:

1. A photomask assembly, comprising:

a pellicle assembly including a pellicle frame and a pellicle film coupled to a first surface of the pellicle frame, the pellicle frame including an inner wall and an outer wall;

a photomask coupled to a second surface of the pellicle frame opposite the pellicle film; and

a molecular sieve associated with the pellicle assembly, the molecular sieve operable to prevent airborne molecular contaminants (AMCs) generated during a lithography process from contaminating the photomask.

2. The photomask assembly of Claim 1, further comprising the molecular sieve formed on an inner wall of the pellicle frame.

3. The photomask assembly of Claim 2, further comprising the molecular sieve formed of a surface adsorption material operable to absorb the AMCs without generating other contaminants.

4. The photomask assembly of Claim 3, further comprising the surface adsorption material selected from the group consisting of metals, metal salts, metal oxides, composite compounds, polymers and organic compounds.

5. The photomask assembly of Claim 1, further comprising the molecular sieve formed of a catalytic material operable to decompose the AMCs into smaller particles.

6. The photomask assembly of Claim 5, further comprising the catalytic material selected from the group consisting of porous titania, anatase titanium oxide, platinum, rhodium, palladium, iridium, osmium and silver.

7. The photomask assembly of Claim 1, further comprising the molecular sieve formed of a gas separation material operable to allow a gas to pass therethrough and prevent the AMCs from contaminating the photomask.

8. The photomask assembly of Claim 7, further comprising the gas separation material selected from the group consisting of glassy polymeric membranes, partially carbonized asymmetric hollow fibers, polysilicone-carbonate copolymer membranes, fluoropolymer membranes, epoxysilicone coated membranes and copolyimide coated membranes.

9. The photomask assembly of Claim 1, further comprising the molecular sieve formed of a high surface area material including a plurality of pores, the pores operable to hold a filter material selected from the group consisting of a surface adsorption material, a catalytic material and a gas separation material.

10. The photomask assembly of Claim 9, wherein the pores comprise a size between approximately five Angstroms and approximately two-hundred Angstroms.

11. The photomask assembly of Claim 9, further comprising the high surface area material selected from the group consisting of high purity silica zeolite, sol-gel silica and macroreticulate polymers.

12. The photomask assembly of Claim 1, further comprising:

a protected space defined by an area between the pellicle film, the photomask and the inner and outer walls of the pellicle frame;

a vent aperture formed in the pellicle frame between the inner and outer walls, the vent aperture operable to allow a gas to pass therethrough; and

the molecular sieve associated with the vent aperture and operable to prevent AMCs from entering into the protected space during the lithography process.

13. The photomask assembly of Claim 12, further comprising the molecular sieve formed on an outer wall of the pellicle frame adjacent an outer opening of the vent aperture.

14. The photomask assembly of Claim 13, further comprising the molecular sieve formed of a surface repellant material operable to prevent the AMCs from entering into the protected area.

15. The photomask assembly of Claim 14, further comprising the surface repellant material selected from a group consisting of fluoropolymers, trifluoromethylated agents, tetrafluoroethylene plastics, fluoro-silicones, Z-dol coatings, fluorinated self-assembled monolayers and coatings including octadecyltrichlorosilane precursor molecules.

16. The photomask assembly of Claim 12, further comprising the molecular sieve formed in the vent aperture.

17. The photomask assembly of Claim 1, further comprising the molecular sieve formed in a grove located in the pellicle frame.

18. A photomask assembly, comprising:

a pellicle assembly including a pellicle frame and a pellicle film coupled to a first surface of the pellicle frame, the pellicle frame including an inner wall and an outer wall;

a vent aperture formed in the pellicle frame between the inner and outer walls, the vent aperture operable to allow a gas to pass therethrough;

a photomask coupled to a second surface of the pellicle frame opposite the pellicle film;

a protected space defined by an area between the pellicle film, the photomask and the inner and outer walls of the pellicle frame; and

a molecular sieve associated with the vent aperture, the molecular sieve operable to prevent airborne molecular contaminants (AMCs) generated during a lithography process from contaminating the protected space.

19. The photomask assembly of Claim 18, further comprising the molecular sieve formed on an inner wall of the pellicle frame adjacent an inner opening of the vent aperture.

20. The photomask assembly of Claim 19, further comprising the molecular sieve formed of a surface adsorption material operable to **absorb the AMCs without generating other contaminants.**

21. The photomask assembly of Claim 18, further comprising the molecular sieve formed on an outer wall of the pellicle frame adjacent an outer opening of the vent aperture.

22. The photomask assembly of Claim 21, further comprising the molecular sieve formed of a surface repellant material operable to prevent the AMCs from entering into the protected space.

23. The photomask assembly of Claim 18, further comprising the molecular sieve formed of a catalytic material operable to decompose the AMCs into smaller particles.

24. The photomask assembly of Claim 18, further comprising the molecular sieve formed of a gas separation material operable to allow a gas to pass therethrough and prevent the AMCs from contaminating the protected space.

25. The photomask assembly of Claim 18, further comprising the molecular sieve formed of a high surface area material including a plurality of pores, the pores operable to hold a filter material selected from the group consisting of a surface adsorption material, surface repellant material, a catalytic material and a gas separation material.

26. The photomask assembly of Claim 25, wherein the pores comprise a size between approximately five Angstroms and approximately two-hundred Angstroms.

27. The photomask assembly of Claim 18, further comprising the molecular sieve formed in the vent aperture.

28. A method for protecting a photomask from contaminants generated during a lithography process, comprising:

providing a photomask assembly including a pellicle assembly coupled to a photomask, the pellicle assembly comprising:

a pellicle film coupled to a first surface of a pellicle frame including an inner wall and an outer wall; and

a second surface of the pellicle frame coupled to the photomask opposite the pellicle film; and

associating a molecular sieve with the pellicle assembly, the molecular sieve operable to prevent airborne molecular contaminants (AMCs) generated during a lithography process from contaminating the photomask.

29. The method of Claim 28, wherein the molecular sieve comprises at least one material, the at least one material selected from the group consisting a surface adsorbent material, a surface repellant materiel, a catalytic material, a gas separation material and a high surface area material.

30. The method of Claim 28, wherein the associating step comprises forming the pellicle frame in part from the molecular sieve.

31. The method of Claim 28, wherein the associating step comprises coating at least a portion of the pellicle assembly with the molecular sieve.

32. The method of Claim 28, wherein the associating step comprises attaching the molecular sieve to the pellicle assembly.

33. The method of Claim 28, further comprising:

forming a vent aperture between the inner and outer walls of the pellicle fame, the vent aperture operable to allow a gas to pass therethrough; and

associating the molecular sieve with the vent aperture.

34. The method of Claim 33, wherein the associating step comprises attaching the molecular sieve to at least one of the outer and inner walls of the pellicle frame.